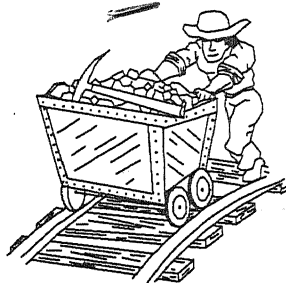


U.S. BUREAU OF MINES



DENVER RESEARCH CENTER

Edward E. Hollop
Research Director

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
DENVER RESEARCH CENTER
P.O. BOX 25086
BUILDING 20, DENVER FEDERAL CENTER
DENVER, COLORADO 80225-0086
TELEPHONE (303) 236-0697
FAX (303) 236-0828

The Bureau of Mines ---

Founded in 1910 to study safety in mines, the U.S. Bureau of Mines now conducts research and collects information concerning almost every activity involved removing minerals from the earth and making them into useful products.

The Bureau has been--and continues to be--the Nation's major source of mining technology and mineral data. Through its research and information programs, it helps provide the United States a secure, dependable supply of minerals at reasonable economic, human, and environmental cost.

The Bureau of Mines is an agency in the Department of the Interior and is managed by the Assistant Secretary of Water and Science. The Director of the Bureau of Mines is assisted by three Associate Directors who are responsible for the functions of Research, Information and Analysis, and Finance and Management.

The Associate Director--Research is the principal Bureau authority on mining and metallurgy research and development. The Division of Health, Safety, and Mining Technology, the Division of Minerals and Materials Science, and the Division of Environmental Technology comprise the Research directorate. The AD--R is responsible for the operation of research centers in Denver, CO, Pittsburgh, PA, Minneapolis, MN, Spokane, WA, Albany, OR, Salt Lake City, UT, Reno, NV, Rolla, MO, and Tuscaloosa, AL.

By developing new technology and providing reliable information as a basis for sound mineral policies, the Bureau of Mines works to solve the country's mineral problems today and in the future.

The Denver Research Center _____

The Denver Research Center is organized into the Office of the Research Director and three Research Divisions: Ground Control, Advanced Mining Systems, and Environmental Studies and Geotechnology. These Divisions are divided into six Research groups. Center personnel consist of 98 full-time permanent and 7 part-time or temporary employees whose professional disciplines include mining, geophysical, mechanical, materials, electronics, structural, and chemical engineering, physics, geophysics, geology, chemistry, and computer science. Key personnel and their telephone numbers are listed below.

Research Director, Denver Research Center
Edward E. Hollop 236-0697
Staff Assistant for Management
Joseph L. Condon 236-9065
Staff Engineer/Technology Transfer Officer
Guy A. Johnson 236-0747

Research Supervisor, Environmental Studies and
Geotechnology Division
Frederick K. Allgaier 236-0769
Group Supervisor, Environmental Geoscience Group
Vacant
Group Supervisor, Geotechnology Group
Khamis Y. Haramy 236-0704

Research Supervisor, Ground Control Division
Brian T. Brady 236-0717
Group Supervisor, Hazard Detection Group
Bernard J. Steblay 236-0742
Group Supervisor, Mine Structure Design Group
Nicholas P. Kripakov 236-0765

Research Supervisor, Advanced Mining Systems
Division
Terry L. Muldoon 236-0737
Group Supervisor, Systems Analysis Group
Kanaan Hanna 236-7563
Group Supervisor, Mine Design Group
William W. Lutzens 236-0719

The Denver Research Center

The Denver Research Center is organized into the Office of the Research Director and three Research Divisions: Ground Control, Advanced Mining Systems, and Environmental Studies and Geotechnology. These Divisions are divided into six Research groups. Center personnel consist of 98 full-time permanent and 7 part-time or temporary employees whose professional disciplines include mining, geophysical, mechanical, materials, electronics, structural, and chemical engineering, physics, geophysics, geology, chemistry, and computer science. Key personnel and their telephone numbers are listed below.

Research Director, Denver Research Center

Edward E. Hollop 236-0697

Staff Assistant for Management

Joseph L. Condon 236-9065

Staff Engineer/Technology Transfer Officer

Guy A. Johnson 236-0747

Research Supervisor, Environmental Studies and Geotechnology Division

Frederick K. Allgaier 236-0769

Group Supervisor, Environmental Geoscience Group

Vacant

Group Supervisor, Geotechnology Group

Khamis Y. Haramy 236-0704

Research Supervisor, Ground Control Division

Brian T. Brady 236-0717

Group Supervisor, Hazard Detection Group

Bernard J. Steblay 236-0742

Group Supervisor, Mine Structure Design Group

Nicholas P. Kripakov 236-0765

Research Supervisor, Advanced Mining Systems Division

Terry L. Muldoon 236-0737

Group Supervisor, Systems Analysis Group

Kanaan Hanna 236-7563

Group Supervisor, Mine Design Group

William W. Lutzens 236-0719

Research Program

The Denver Research Center conducts research to develop improved technology to reduce the health and safety hazards and adverse environmental effects of mining and to increase the efficiency, productivity, and resource recovery of our domestic critical, strategic, and essential minerals. The Center also provides technical support to the Department of Energy, the Nuclear Regulatory Commission, the Environmental Protection Agency, the Office of Surface Mining and Regulatory Enforcement, and the Mine Safety and Health Administration. The work of the three Divisions is briefly described below.

GROUND CONTROL DIVISION

Dr. Brian T. Brady

The Ground Control Division investigates innovative methods to predict, evaluate, and mitigate ground control problems (bumps, outbursts, rock bursts, entry stability, floor heave, etc.) through integration of acoustic (microseismic, ultrasonic) technology with rock mechanics field data and observations and state-of-the-art numerical modeling techniques.

Researchers, using mine-wide monitoring systems in underground mines, are monitoring microseismic events to improve forecasting, control, and prevention of rock bursts in hard-rock mines and mitigate hazards associated with bumps in coal mines. Numerical model studies, using Bureau-developed computer programs, endeavor to reduce hazards through better mine design and identify novel mining methods that will increase productivity. Studies of longwall gateroad configurations will identify which systems are viable candidates for specific mining environments.

ADVANCED MINING SYSTEMS DIVISION

Terry L. Muldoon, Research Supervisor

The mission of the Advanced Mining Systems Division is to design, develop, and evaluate advanced systems to improve safety, productivity, and efficiency in U.S. mines.

New underground haulage systems are being evaluated to improve the safety and reduce the cost of transporting coal and ore to the surface. A scale model of a balanced air-lift hydrohoist system is being constructed prior to an actual in-mine test of the novel technology. A magnetic-levitation transportation system being investigated could conceivably minimize hazards to miners through reduced exposure to moving machinery, improve production by reducing downtime, and lower transportation costs. A newly developed Ground Control Monitoring System will assist mine engineers identify and solve ground control problems. The system uses mine-wide monitoring hardware to collect, analyze, and display data on critical ground control parameters in real time. Current testing includes deploying the system on a longwall face, transmitting the data from the underground mine to the research center, and developing automated data analysis and display technology.

A mining system that uses liquid solvents to remove metals from rubblized underground stopes is also being evaluated. This "Stope Leaching" method allows the metals to be removed from the rock, leaving the waste rock underground.

Improving mine designs to make more efficient use of mechanical excavation technologies is the goal of another project. If successful, more strategic minerals could be produced at lower costs. Under the Abandoned Mine Land program, researchers are investigating the use of low-density foam concrete to seal abandoned mine shafts and adits to protect the health and safety of the public and prevent further environmental damage.

1790

**ENVIRONMENTAL STUDIES AND
GEOTECHNOLOGY DIVISION**

Frederick K. Allgaier, Research Supervisor

The Environmental Studies and Geotechnology Division develops and applies environmental and geotechnical engineering technology to forecast, investigate, and remediate problems that may be encountered prior to and following mining.

Environmental research includes projects in the areas of mine subsidence, abandoned mine lands, hazardous waste site characterization and remediation, and radiation monitoring. Mine subsidence research will concentrate on developing methods to forecast and mitigate the impacts of subsidence on escarpments, hydrology, and other surface resources. Abandoned mine land research is developing and applying geophysical techniques to locate abandoned underground openings and delineate potential subsidence zones above the openings. Hazardous waste research is addressing water and soil contamination from past mining activities and characterizing waste sites using geophysical methods and remote sensing, as well as assisting EPA and State agencies on Superfund and mining-related waste problems. Research in radiation monitoring has established worldwide standards for radiation measurements in one of the premier radiation calibration laboratories in the world.

Coal mine safety research includes a novel "thrust bolting" technique as part of a comprehensive study of weak rock problems; an automated system to detect and mitigate problems related to stress buildup on longwall panels; investigations into pillar-strengthening techniques; and the use of remote sensing, satellite imagery, and ground penetrating radar to identify hazards before they are encountered by mining.